established based upon inlet and residual exhaust gas temperatures to properly set the proportional solenoid valve. Fuel is increased to the combustor until the rotor rotates at 100% of its design rotor speed. Following the initial light-off, the control system monitors the exhaust gas temperature above 1000° F. and controls the acceleration rate of the rotor speed to approximately 90% of the design rotor speed. At this point, control of the fuel occurs so that the exhaust temperature is within a range of 500° F. to 1000° F., and more preferably, between 500° F. to 700° F. Start time to 100% design rotor speed could be less than ten seconds. An over temperature shutoff switch is positioned near the exhaust port so as to shut off the fuel supply if the exhaust temperature exceeds a preset value for a number of seconds. At a 90% design rotor speed of the unit rotor speed, the system will be controlled through a closed route loop to maintain a 100% design rotor speed. Thus, fuel flow will vary on the load demand to maintain a 100% design rotor speed. Preferably, the speed control loop at 100% design rotor speed is maintained by shutting the ignition off and pulling the power from the system. The exhaust gas temperature will vary with power demands.

The present invention has the ability to maintain a 100% design rotor speed during an on-load and off-load condition and is believed that approximately 50% of the total turbine power is required to drive the compressor in a no-load condition. Further, the engine controller monitors the system to determine whether there has been a failure of the fuel pump, the oil pump or the electric motor 52 driving these pumps.

Having described the presently preferred embodiments of the invention, it is to be understood that they may otherwise be embodied within the scope of the appended claims.

We claim:

1. An electricity generating system, comprising:

a body;

a combustor provided in said body;

a turbine made of a plurality of turbine blades secured to a rotor, provided in said body and in fluid communication with said combustor;

a compressor chamber provided in said body and in fluid communication with said combustor;

a plurality of compressor blades secured to said rotor, said compressor blades positioned within a compressor chamber;

an air inlet port in fluid communication with said compressor chamber;

an exit port in fluid communication with said turbine;

a plurality of magnets secured to said rotor; and

a stator made of a magnetically attracted material provided in said body, said stator positioned in close proximity to said plurality of magnets whereby rotation of said rotor causes a change in flux about said stator thereby generating electricity; and

a fuel metering valve in fluid communication with said combustor, wherein said fuel metering valve comprises a proportional solenoid having a plunger having a tip, said plunger adapted to extend along a longitudinal axis, a valve body defining a plunger cavity, an inlet and an outlet, said plunger extending within said plunger cavity, and a flow plate having a hole defined therein, said flow plate secured to said valve body and positioned within said plunger cavity between said inlet and said outlet whereby movement of said plunger in a first longitudinal direction causes said tip to coact with the hole defined in said flow plate to vary a flow from said inlet to said outlet through said hole defined in said hole plate.

2. An electricity generating system as claimed in claim 1, wherein said tip has a diameter that varies with respect to the longitudinal axis.

3. An electricity generating system as claimed in claim 2, wherein the tip diameter varies between a diameter less than a diameter of the hole defined in said flow plate to a diameter greater than the diameter defined in the flow plate whereby said plunger is adapted to move both in the first longitudinal direction and a second longitudinal direction, and when said plunger moves a first distance in the first longitudinal direction, said plunger tip extends through said hole defined in said flow plate and contacts said flow plate, blocking flow across said flow plate in a blocked position, and when said plunger is moved in the second direction from the blocked position, said tip is positioned away from said flow plate and flow through said flow plate varies as a function of a longitudinal position of said tip.

4. An electricity generating system, comprising:

a body;

a combustor provided in said body;

a turbine made of a plurality of turbine blades secured to a rotor, provided in said body and in fluid communication with said combustor;

a compressor chamber provided in said body and in fluid communication with said combustor;

a plurality of compressor blades secured to said rotor, said compressor blades positioned within a compressor chamber;

an air inlet port in fluid communication with said compressor chamber;

an exit port in fluid communication with said turbine;

a plurality of magnets secured to said rotor;

a stator made of a magnetically attracted material provided in said body, said stator positioned in close proximity to said plurality of magnets whereby rotation of said rotor causes a change in flux about said stator thereby generating electricity; and

a fuel metering valve fluidly coupled to said combustor, wherein said fuel metering valve comprises a proportional solenoid having a plunger that is adapted to extend along a longitudinal axis, said plunger having a tip, and a valve body defining a plunger cavity, an inlet and an outlet, said plunger extending within said plunger cavity, said tip having a blocking portion and a flow passageway defined therein having an inlet port and an outlet port, wherein said inlet port is in fluid communication with said outlet port whereby movement of said tip in a first longitudinal direction causes said inlet port, outlet port and blocking member to coact with said inlet and outlet to vary a flow through said valve body from said inlet to said outlet.

5. An electricity generating system, comprising:

a body;

a combustor provided in said body;

a turbine made of a plurality of turbine blades secured to a rotor, provided in said body and in fluid communication with said combustor;

a compressor chamber provided in said body and in fluid communication with said combustor;

a plurality of compressor blades secured to said rotor, said compressor blades positioned within a compressor chamber;

an air inlet port in fluid communication with said compressor chamber;

an exit port in fluid communication with said turbine;

a plurality of magnets secured to said rotor;

a stator made of a magnetically attracted material provided in said body, said stator positioned in close proximity to said plurality of magnets whereby rotation of said rotor causes a change in flux about said stator thereby generating electricity;

an annular-shaped bearing rotatably receiving a cylindrical portion of said rotor through an annulus defined in said bearing, said bearing secured to said body, said bearing adapted to support said rotor so that said rotor can rotate about a longitudinal axis; and

a locking arrangement for securing said bearing to said body, said locking arrangement, comprising a lug secured to said bearing and extending in a radial direction away from the annulus, a cylindrical bearing receiving hole defined in the body to receive said bearing and a lug receiving recess defined in said body for receiving said lug and prevent said bearing from rotating about the longitudinal axis relative to said body, and a locking member coacting with said bearing for limiting movement of said bearing in a first longitudinal direction relative to said body.

6. An electricity generating system as claimed in claim 5, wherein said lug receiving recess terminates at said body at a termination point, the termination point coacts with said lug for limiting movement of said sleeve in a second longitudinal direction relative to said body.

7. An electricity generating system, comprising:

a body;

a combustor provided in said body;

a turbine made of a plurality of turbine blades secured to a rotor, provided in said body and in fluid communication with said combustor;

a compressor chamber provided in said body and in fluid communication with said combustor;

a plurality of compressor blades secured to said rotor, said compressor blades positioned within a compressor chamber;

an air inlet port in fluid communication with said compressor chamber;

an exit port in fluid communication with said turbine;

a plurality of magnets secured to said rotor;

a stator made of a magnetically attracted material provided in said body, said stator positioned in close proximity to said plurality of magnets whereby rotation of said rotor causes a change in flux about said stator thereby generating electricity;

an annular-shaped bearing rotatably receiving a cylindrical portion of said rotor through an annulus defined in said bearing, said bearing secured to said body, said bearing adapted to support said rotor so that said rotor can rotate about a longitudinal axis; and

a damper positioned between an outer surface of said bearing and said body.

8. An electricity generating system as claimed in claim 7, wherein said damper is an O-ring made of elastomeric material.

9. An electricity generating system as claimed in claim 6, wherein two lug receiving recesses are defined by a pair of spaced arcuate lips, each of said accurate lips defining an open faced lug receiving recess, wherein the lug receiving recesses are spaced apart and wherein an annular retention lug ring having two radially extending lugs is secured to said bearing, said lugs received by respective lug receiving recesses, and wherein said locking member is a snap ring received within snap ring recesses defined in said arcuate-shaped lips.

10. An electricity generating system, comprising:

a body;

a combustor provided in said body;

a turbine made of a plurality of turbine blades secured to a rotor, provided in said body and in fluid communication with said combustor;

a compressor chamber provided in said body and in fluid communication with said combustor;

a plurality of compressor blades secured to said rotor, said compressor blades positioned within a compressor chamber;

an air inlet port in fluid communication with said compressor chamber;

an exit port in fluid communication with said turbine;

a plurality of magnets secured to said rotor;

a stator made of a magnetically attracted material provided in said body, said stator positioned in close proximity to said plurality of magnets whereby rotation of said rotor causes a change in flux about said stator thereby generating electricity;

a fuel pump in fluid communication with said annular combustor;

a bearing for rotatably supporting said rotor;

a lubricating oil pump in fluid communication with said bearing; and

an electric motor coupled to said fuel pump and said lubricating oil pump wherein said fuel pump and said lubricating oil pump are driven by said motor.

11. An electricity generating system as claimed in claim 10, wherein said fuel pump and said oil pump are positive displacement pumps.

12. An electricity generating system as claimed in claim 11, wherein each of said pumps comprises an inner rotor positioned within a casing, said inner rotor adapted to move about said casing to pump fluid through said casing, each of said inner rotors driven by said electric motor.

13. An electricity generating system as claimed in claim 11, wherein each of said positive displacement pumps is of the generator type, wherein each of said inner rotors coacts with an outer rotor positioned between said casing and said inner rotor, and a shaft is coupled to at least one of said inner rotors and said electric motor.

14. An electricity generating system as claimed in claim 10, wherein said combustor is an annular combustor.

15. An electricity system as claimed in claim 1, wherein said combustor is an annular combustor.

16. An electricity system as claimed in claim 4, wherein said combustor is an annular combustor.

17. An electricity system as claimed in claim 5, wherein said combustor is an annular combustor.

18. An electricity system as claimed in claim 7, wherein said combustor is an annular combustor.

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